

SEQUENCE LISTING

<110> Jochmus, Ingrid
Nieland, John

<120> Cytotoxic T-Cell Epitopes of the
Papilloma Virus L1-Protein and Use Thereof in Diagnosis and
Therapy

<130> 50125/036001

<140> US 09/980,177

<141> 2001-11-29

<150> PCT/EP00/05006

<151> 2000-05-31

<150> DE 19925199.1

<151> 1999-06-01

<160> 77

<170> FastSEQ for Windows Version 4.0

<210> 1

<211> 9

<212> PRT

<213> Human papillomavirus type 16

<400> 1

Ile Leu Val Pro Lys Val Ser Gly Leu

1

5

<210> 2

<211> 9

<212> PRT

<213> Human papillomavirus type 16

<400> 2

Arg Leu Val Trp Ala Cys Val Gly Val

1

5

<210> 3

<211> 9

<212> PRT

<213> Human papillomavirus type 16

<400> 3

His Leu Phe Asn Arg Ala Gly Thr Val

1

5

<210> 4

<211> 9

<212> PRT

<213> Human papillomavirus type 16

<400> 4

Tyr Leu Arg Arg Glu Gln Met Phe Val
1 5

<210> 5

<211> 9

<212> PRT

<213> Human papillomavirus type 16

<400> 5

Thr Leu Gln Ala Asn Lys Ser Glu Val
1 5

<210> 6

<211> 9

<212> PRT

<213> Human papillomavirus type 16

<400> 6

Ile Leu Glu Asp Trp Asn Phe Gly Leu
1 5

<210> 7

<211> 12

<212> PRT

<213> Human papillomavirus type 16

<400> 7

Ser Leu Trp Leu Pro Ser Glu Ala Thr Val Tyr Leu
1 5 10

<210> 8

<211> 10

<212> PRT

<213> Human papillomavirus type 16

<400> 8

Asn Leu Ala Ser Ser Asn Tyr Phe Pro Thr
1 5 10

<210> 9

<211> 10

<212> PRT

<213> Human papillomavirus type 16

<400> 9

Thr Leu Thr Ala Asp Val Met Thr Tyr Ile
1 5 10

<210> 10

<211> 10
<212> PRT
<213> Human papillomavirus type 16

<400> 10
Tyr Leu Pro Pro Val Pro Val Ser Lys Val
1 5 10

<210> 11
<211> 9
<212> PRT
<213> Human papillomavirus type 16

<400> 11
Tyr Asp Leu Gln Phe Ile Phe Gln Leu
1 5

<210> 12
<211> 9
<212> PRT
<213> Human papillomavirus type 16

<400> 12
Ile Cys Trp Gly Asn Gln Leu Phe Val
1 5

<210> 13
<211> 9
<212> PRT
<213> Human papillomavirus type 16

<400> 13
Phe Tyr Asn Pro Asp Thr Gln Arg Leu
1 5

<210> 14
<211> 9
<212> PRT
<213> Human papillomavirus type 16

<400> 14
Met His Gly Asp Thr Pro Thr Leu His
1 5

<210> 15
<211> 8
<212> PRT
<213> Human papillomavirus type 16

<400> 15
Glu Thr Thr Asp Leu Tyr Cys Tyr
1 5

<210> 16
<211> 10
<212> PRT
<213> Human papillomavirus type 16

<400> 16
Gln Ala Glu Pro Asp Arg Ala His Tyr Asn
1 5 10

<210> 17
<211> 9
<212> PRT
<213> Human papillomavirus type 16

<400> 17
Ser Met Val Thr Ser Asp Ala Gln Ile
1 5

<210> 18
<211> 9
<212> PRT
<213> Human papillomavirus type 16

<400> 18
Gly Ile Leu Gly Phe Val Phe Thr Leu
1 5

<210> 19
<211> 10
<212> PRT
<213> Human papillomavirus type 16

<400> 19
Tyr Met Leu Asp Leu Gln Pro Glu Thr Thr
1 5 10

<210> 20
<211> 9
<212> PRT
<213> Human papillomavirus type 16

<400> 20
Ser Met Asp Tyr Lys Gln Thr Gln Leu
1 5

<210> 21
<211> 9
<212> PRT
<213> Human papillomavirus type 16

<400> 21
Thr Leu Glu Asp Thr Tyr Arg Phe Val
1 5

<210> 22
<211> 9
<212> PRT
<213> Human papillomavirus type 16

<400> 22
Phe Gln Leu Cys Lys Ile Thr Leu Thr
1 5

<210> 23
<211> 9
<212> PRT
<213> Human papillomavirus type 16

<400> 23
Lys Val Val Ser Thr Asp Glu Tyr Val
1 5

<210> 24
<211> 9
<212> PRT
<213> Human papillomavirus type 16

<400> 24
Gln Leu Phe Val Thr Val Val Asp Thr
1 5

<210> 25
<211> 9
<212> PRT
<213> Human papillomavirus type 16

<400> 25
Gly Leu Gln Tyr Arg Val Phe Arg Ile
1 5

<210> 26
<211> 20
<212> PRT
<213> Human papillomavirus type 16

<400> 26
Met Ser Leu Tyr Leu Pro Ser Glu Ala Thr Val Tyr Leu Pro Pro Val
1 5 10 15
Pro Val Ser Lys
20

<210> 27
<211> 20
<212> PRT
<213> Human papillomavirus type 16

<400> 27
 Tyr Leu Pro Pro Val Pro Val Ser Lys Val Val Ser Thr Asp Glu Tyr
 1 5 10 15
 Val Ala Arg Thr
 20

<210> 28
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

<400> 28
 Ser Thr Asp Glu Tyr Val Ala Arg Thr Asn Ile Tyr Tyr His Ala Gly
 1 5 10 15
 Thr Ser Arg Leu
 20

<210> 29
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

<400> 29
 Tyr Tyr His Ala Gly Thr Ser Arg Leu Leu Ala Val Gly His Pro Tyr
 1 5 10 15
 Phe Pro Ile Lys
 20

<210> 30
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

<400> 30
 Val Gly His Pro Tyr Phe Pro Ile Lys Lys Pro Asn Asn Asn Lys Ile
 1 5 10 15
 Leu Val Pro Lys
 20

<210> 31
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

<400> 31
 Asn Asn Asn Lys Ile Leu Val Pro Lys Val Ser Gly Leu Gln Tyr Arg
 1 5 10 15
 Val Phe Arg Ile
 20

<210> 32
 <211> 20
 <212> PRT

<213> Human papillomavirus type 16

<400> 32

Gly Leu Gln Tyr Arg Val Phe Arg Ile His Leu Pro Asp Pro Asn Lys
1 5 10 15
Phe Gly Phe Pro
20

<210> 33

<211> 20

<212> PRT

<213> Human papillomavirus type 16

<400> 33

Pro Asp Pro Asn Lys Phe Gly Phe Pro Asp Thr Ser Phe Tyr Asn Pro
1 5 10 15
Asp Thr Gln Arg
20

<210> 34

<211> 20

<212> PRT

<213> Human papillomavirus type 16

<400> 34

Ser Phe Tyr Asn Pro Asp Thr Gln Arg Leu Val Trp Ala Cys Val Gly
1 5 10 15
Val Glu Val Gly
20

<210> 35

<211> 20

<212> PRT

<213> Human papillomavirus type 16

<400> 35

Trp Ala Cys Val Gly Val Glu Val Gly Arg Gly Gln Pro Leu Gly Val
1 5 10 15
Gly Ile Ser Gly
20

<210> 36

<211> 20

<212> PRT

<213> Human papillomavirus type 16

<400> 36

Gln Pro Leu Gly Val Gly Ile Ser Gly His Pro Leu Leu Asn Lys Leu
1 5 10 15
Asp Asp Thr Glu
20

<210> 37

<211> 20
 <212> PRT
 <213> Human papillomavirus type 16

 <400> 37
 Leu Leu Asn Lys Leu Asp Asp Thr Glu Asn Ala Ser Ala Tyr Ala Ala
 1 5 10 15
 Asn Ala Gly Val
 20

<210> 38
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

<400> 38
 Ser Ala Tyr Ala Ala Asn Ala Gly Val Asp Asn Arg Glu Cys Ile Ser
 1 5 10 15
 Met Asp Tyr Lys
 20

<210> 39
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

<400> 39
 Arg Glu Cys Ile Ser Met Asp Tyr Lys Gln Thr Gln Leu Cys Leu Ile
 1 5 10 15
 Gly Cys Lys Pro
 20

<210> 40
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

<400> 40
 Gln Leu Cys Leu Ile Gly Cys Lys Pro Pro Ile Gly Glu His Trp Gly
 1 5 10 15
 Lys Gly Ser Pro
 20

<210> 41
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

<400> 41
 Gly Glu His Trp Gly Lys Gly Ser Pro Cys Thr Asn Val Ala Val Asn
 1 5 10 15
 Pro Gly Asp Cys
 20

<210> 42
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

 <400> 42
 Asn Val Ala Val Asn Pro Gly Asp Cys Pro Pro Leu Glu Leu Ile Asn
 1 5 10 15
 Thr Val Ile Gln
 20

<210> 43
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

<400> 43
 Leu Glu Leu Ile Asn Thr Val Ile Gln Asp Gly Asp Met Val Asp Thr
 1 5 10 15
 Gly Phe Gly Ala
 20

<210> 44
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

<400> 44
 Asp Met Val Asp Thr Gly Phe Gly Ala Met Asp Phe Thr Thr Leu Gln
 1 5 10 15
 Ala Asn Lys Ser
 20

<210> 45
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

<400> 45
 Phe Thr Thr Leu Gln Ala Asn Lys Ser Glu Val Pro Leu Asp Ile Cys
 1 5 10 15
 Thr Ser Ile Cys
 20

<210> 46
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

<400> 46
 Pro Leu Asp Ile Cys Thr Ser Ile Cys Lys Tyr Pro Asp Tyr Ile Lys
 1 5 10 15
 Met Val Ser Glu
 20

<210> 47
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

<400> 47
 Pro Asp Tyr Ile Lys Met Val Ser Glu Pro Tyr Gly Asp Ser Leu Phe
 1 5 10 15
 Phe Tyr Leu Arg
 20

<210> 48
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

<400> 48
 Gly Asp Ser Leu Phe Phe Tyr Leu Arg Arg Glu Gln Met Phe Val Arg
 1 5 10 15
 His Leu Phe Asn
 20

<210> 49
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

<400> 49
 Gln Met Phe Val Arg His Leu Phe Asn Arg Ala Gly Ala Val Gly Glu
 1 5 10 15
 Asn Val Pro Asp
 20

<210> 50
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

<400> 50
 Gly Ala Val Gly Glu Asn Val Pro Asp Asp Leu Tyr Ile Lys Gly Ser
 1 5 10 15
 Gly Ser Thr Ala
 20

<210> 51
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

<400> 51
 Tyr Ile Lys Gly Ser Gly Ser Thr Ala Asn Leu Ala Ser Ser Asn Tyr
 1 5 10 15
 Phe Pro Thr Pro

20

<210> 52
<211> 20
<212> PRT
<213> Human papillomavirus type 16

<400> 52
Ala Ser Ser Asn Tyr Phe Pro Thr Pro Ser Gly Ser Met Val Thr Ser
1 5 10 15
Asp Ala Gln Ile
20

<210> 53
<211> 20
<212> PRT
<213> Human papillomavirus type 16

<400> 53
Ser Met Val Thr Ser Asp Ala Gln Ile Phe Asn Lys Pro Tyr Trp Leu
1 5 10 15
Gln Arg Ala Gln
20

<210> 54
<211> 20
<212> PRT
<213> Human papillomavirus type 16

<400> 54
Lys Pro Tyr Trp Leu Gln Arg Ala Gln Gly His Asn Asn Gly Ile Cys
1 5 10 15
Trp Gly Asn Gln
20

<210> 55
<211> 20
<212> PRT
<213> Human papillomavirus type 16

<400> 55
Asn Asn Gly Ile Cys Trp Gly Asn Gln Leu Phe Val Thr Val Val Asp
1 5 10 15
Thr Thr Arg Ser
20

<210> 56
<211> 20
<212> PRT
<213> Human papillomavirus type 16

<400> 56
Val Thr Val Val Asp Thr Thr Arg Ser Thr Asn Met Ser Leu Cys Ala

| | | | |
|-----------------|---|----|----|
| 1 | 5 | 10 | 15 |
| Ala Ile Ser Thr | | | |
| 20 | | | |

<210> 57
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

| | | | |
|---|---|----|----|
| <400> 57 | | | |
| Met Ser Leu Cys Ala Ala Ile Ser Thr Ser Glu Thr Thr Tyr Lys Asn | | | |
| 1 | 5 | 10 | 15 |
| Thr Asn Phe Lys | | | |
| 20 | | | |

<210> 58
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

| | | | |
|---|---|----|----|
| <400> 58 | | | |
| Thr Thr Tyr Lys Asn Thr Asn Phe Lys Glu Tyr Leu Arg His Gly Glu | | | |
| 1 | 5 | 10 | 15 |
| Glu Tyr Asp Leu | | | |
| 20 | | | |

<210> 59
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

| | | | |
|---|---|----|----|
| <400> 59 | | | |
| Leu Arg His Gly Glu Glu Tyr Asp Leu Gln Phe Ile Phe Gln Leu Cys | | | |
| 1 | 5 | 10 | 15 |
| Lys Ile Thr Leu | | | |
| 20 | | | |

<210> 60
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

| | | | |
|---|---|----|----|
| <400> 60 | | | |
| Ile Phe Gln Leu Cys Lys Ile Thr Leu Thr Ala Asp Val Met Thr Tyr | | | |
| 1 | 5 | 10 | 15 |
| Ile His Ser Met | | | |
| 20 | | | |

<210> 61
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

<400> 61
 Asp Val Met Thr Tyr Ile His Ser Met Asn Ser Thr Ile Leu Glu Asp
 1 5 10 15
 Trp Asn Phe Gly
 20

<210> 62
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

<400> 62
 Thr Ile Leu Glu Asp Trp Asn Phe Gly Leu Gln Pro Pro Pro Gly Gly
 1 5 10 15
 Thr Leu Glu Asp
 20

<210> 63
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

<400> 63
 Pro Pro Pro Gly Gly Thr Leu Glu Asp Thr Tyr Arg Phe Val Thr Ser
 1 5 10 15
 Gln Ala Ile Ala
 20

<210> 64
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

<400> 64
 Arg Phe Val Thr Ser Gln Ala Ile Ala Cys Gln Lys His Thr Pro Pro
 1 5 10 15
 Ala Pro Lys Glu
 20

<210> 65
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

<400> 65
 Lys His Thr Pro Pro Ala Pro Lys Glu Asp Pro Leu Lys Lys Tyr Thr
 1 5 10 15
 Phe Trp Glu Val
 20

<210> 66
 <211> 20
 <212> PRT

<213> Human papillomavirus type 16

<400> 66

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Leu | Lys | Lys | Tyr | Thr | Phe | Trp | Glu | Val | Asn | Leu | Lys | Glu | Lys | Phe | Ser |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |
| Ala | Asp | Leu | Asp | | | | | | | | | | | | |
| | | | | 20 | | | | | | | | | | | |

<210> 67

<211> 20

<212> PRT

<213> Human papillomavirus type 16

<400> 67

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Lys | Glu | Lys | Phe | Ser | Ala | Asp | Leu | Asp | Gln | Phe | Pro | Leu | Gly | Arg | Lys |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |
| Phe | Leu | Leu | Gln | | | | | | | | | | | | |
| | | | | 20 | | | | | | | | | | | |

<210> 68

<211> 20

<212> PRT

<213> Human papillomavirus type 16

<400> 68

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Pro | Leu | Gly | Arg | Lys | Phe | Leu | Leu | Gln | Ala | Gly | Met | His | Gly | Asp | Thr |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |
| Pro | Thr | Leu | His | | | | | | | | | | | | |
| | | | | 20 | | | | | | | | | | | |

<210> 69

<211> 20

<212> PRT

<213> Human papillomavirus type 16

<400> 69

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | His | Gly | Asp | Thr | Pro | Thr | Leu | His | Glu | Tyr | Met | Leu | Asp | Leu | Gln |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |
| Pro | Glu | Thr | Thr | | | | | | | | | | | | |
| | | | | 20 | | | | | | | | | | | |

<210> 70

<211> 20

<212> PRT

<213> Human papillomavirus type 16

<400> 70

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Leu | Asp | Leu | Gln | Pro | Glu | Thr | Thr | Asp | Leu | Tyr | Cys | Tyr | Glu | Gln |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |
| Leu | Asn | Asp | Ser | | | | | | | | | | | | |
| | | | | 20 | | | | | | | | | | | |

<210> 71

<211> 20
 <212> PRT
 <213> Human papillomavirus type 16

 <400> 71
 Tyr Cys Tyr Glu Gln Leu Asn Asp Ser Ser Glu Glu Glu Asp Glu Ile
 1 5 10 15
 Asp Gly Pro Ala
 20

 <210> 72
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

 <400> 72
 Glu Glu Asp Glu Ile Asp Gly Pro Ala Gly Gln Ala Glu Pro Asp Arg
 1 5 10 15
 Ala His Tyr Asn
 20

 <210> 73
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

 <400> 73
 Ala Glu Pro Asp Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys
 1 5 10 15
 Cys Asp Ser Thr
 20

 <210> 74
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

 <400> 74
 Thr Phe Cys Cys Lys Cys Asp Ser Thr Leu Arg Leu Cys Val Gln Ser
 1 5 10 15
 Thr His Val Asp
 20

 <210> 75
 <211> 20
 <212> PRT
 <213> Human papillomavirus type 16

 <400> 75
 Leu Cys Val Gln Ser Thr His Val Asp Ile Arg Thr Leu Glu Asp Leu
 1 5 10 15
 Leu Met Gly Thr
 20

<210> 76
 <211> 21
 <212> PRT
 <213> Human papillomavirus type 16

<400> 76
 Thr Leu Glu Asp Leu Leu Met Gly Thr Leu Gly Ile Val Cys Pro Ile
 1 5 10 15
 Cys Ser Gln Lys Pro
 20

<210> 77
 <211> 20
 <212> PRT
 <213> Influenza virus type A

<400> 77
 Lys Glu Tyr Leu Arg His Gly Glu Glu Gly Ile Leu Gly Phe Val Phe
 1 5 10 15
 Thr Leu Cys Lys
 20